CLAIMS OF INVENTION

What is claimed is:

1. In a method for making filter elements comprising mixing activated carbon and polymeric binder; extruding the mixture at a predetermined velocity through an extruder barrel, heating the mixture in the barrel to a temperature above the softening point of at least some of the polymeric binder, molding the mixture into a porous element, and cooling said porous element below the melting point of the polymeric binder; the improvement comprising increasing the density of the porous structure in a direction from the periphery thereof to the center of the structure and then removing the mixture from the discharge end of the extruder.

2. The method of claim 1 wherein at least some of the polymeric binder is introduced in the form of fibers.

3. The method of claim 2 wherein, in a first step the granular activated carbon and the polymeric binder are mixed with intensive agitation, and then the activated carbon fibers are introduced and mixed with less vigorous agitation.

4. The method of claim 1 wherein the density of the porous structure is variably increased by moving the molded structure forward in the extruder using a predetermined screw rotation velocity, and then passing the porous element through an extrusion head having a mandrel which operates at a rotation velocity lower than the screw rotation velocity.

5. The method of claim 4 wherein the mandrel rotation velocity is from 0.001-0.99 times the screw rotation velocity.

6. The method of claim 1 wherein the polymeric binder is introduced in the form of a mixture of fibrous polymers.

7. The method of claim 6 wherein the polymeric binder is a mixture of fibrous polymers of at least two different polymeric compositions, with the melting point of one type of polymer differing by at least 10°C from the melting point of the other.

8. The method of claim 1 wherein the polymeric binder is introduced in the form of a mixture of powdered and fibrous polymers.

9. The method of claim 8 wherein the melting point of the powdered polymer is lower than the melting point of the fibrous polymer.

10. The method of claim 1 wherein the polymeric binder comprises a material selected from the group consisting of polypropylene fibers, polyethylene fibers and polyamide fibers.

11. A method of claim 10 specified by the use of fibrous polymeric binder having an average fiber length of about 5 to 20 times the average fiber diameter.

12. The method of claim 1 wherein the activated carbon fibers have an average length of about 2 to 100 times the average fiber diameter.

13. Apparatus for the continuous extrusion of filter elements from a mixture of activated carbon material and polymeric binder comprising an extruder barrel having an inlet and a discharge end, means to feed the mixture into said inlet, a screw within said barrel positioned coaxial to the barrel and being comprised of a core having helical flights thereon, means to control the temperature within said barrel, an extrusion head, and means connecting the discharge end of the barrel with the extrusion head, with the extrusion head being positioned along the longitudinal axis of and adapted to receive material from the discharge end of the barrel, said connecting means comprising a generally conically expanding inner wall that connects the barrel to the extrusion head, and a mandrel fixed to the screw, said mandrel comprising a generally conically expanding outer wall positioned inwardly of the conically expanding inner wall of the connecting means.

14. The apparatus of claim 13 wherein the helical flights of the screw are formed with a gradual decrease of the flight width in the direction of the discharge end of the barrel, said decrease being provided by having the spacing between the front wall of adjacent helical flights less than the corresponding rear wall spacing.

15. The apparatus of claim 13 wherein said mandrel is adapted to rotate freely with respect to rotation of the screw core.

16. The apparatus of claim 13 wherein the interior surface of the barrel has a circular cross section.

17. The apparatus of claim 13 wherein the interior surface of the barrel has an oval cross section.

18. The apparatus of claim 13 wherein the diameter of the screw core is constant along its the entire length.

19. The apparatus of claim 13 wherein the angle of the conical surface of the generally conically expanding inner wall of said connecting means is greater than the angle of the generally conical outer surface connecting the screw core to the mandrel.

20. A filter element comprising of activated carbon fibers, activated carbon granules and polymeric binder; wherein the density of the porous structure increases in a direction from the periphery thereof to the center of the structure.